Measuring cultural diversity with the Stirling model

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Abstract

Cultural Diversity has become an important notion at the international level and notably as a foundation for policies towards development. A sound definition and measurement are however still missing. The paper discusses the growing use of the Stirling Model in economic analyses of Cultural Diversity, and related indexes. The model's importance and limitations are discussed. The paper should most of all be seen as a step towards the building of a framework allowing to debate Cultural Diversity.

Keywords: Diversity of cultural expressions; Stirling Index; Stirling definition.

1. Why measuring Cultural Diversity is important, and related risks

Cultural Diversity has become established as an unavoidable concept in international negotiations related to the cultural field (Stenou, 2003), in particular with the unanimous adoption of the UNESCO Universal Declaration on Cultural Diversity (2001) followed by the almost unanimous approval of the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions (20 October 2005) and its fast ratification by countries.

The success of the Convention is based on the consensus that surrounds the notion of Cultural Diversity (Ranaivoson, 2007). There are obviously good reasons for Cultural Diversity to have become a cornerstone in the development of policies related to culture, and beyond. It can be seen as a common heritage of humanity (Unesco, 2005). The sheer existence of Cultural Diversity enriches the whole humanity. At an individual level, Cultural Diversity increases the range of choices available (Unesco, 2005). In fact, from an economic point of view, consumers as a whole value diversity because they have different tastes or because every consumers has a taste for diversity (Ranaivoson, 2012). Beyond the economic approach, Cultural Diversity is a capacity for expression, creation and innovation (Unesco, 2001).

A crucial assumption of this paper is that Cultural Diversity is an important concept. The concept however needs to be more precisely defined, in particular to allow its measurement. There is a growing literature on the topic but it still lacks a common framework. The paper argues that the Stirling model can provide the basis for such a framework.

Cultural Diversity has been criticized due to its blurriness (Bonet and Négrier, 2011). For example, Cultural Diversity is accused of allowing to support any policy or strategy (Creton, 2003). Therefore the polysemous concept can hardly be used in a normative way to guide public policies. A related consequence is the lack of a statistical framework that would enable to measure Cultural Diversity (Ranaivoson, 2010b). Last but not least, measuring may be necessary to address policies (e.g. Bernier, 2003), more precisely to assess their impact.

There are however specific issues/risks related to the measurement of cultural diversity. The first one is the objectivation of categories, i.e. to consider that the cultural categories exist per se – while they are cultural constructs and therefore to some extent subjective. Another risk is to get a purely mechanistic view of diversity. One aim of measuring cultural diversity is to monitor its evolution over time and the impact of different factors (e.g. policies). Culture is however too complex for researchers to isolate a few variables that would explain its evolution. Thus, while one aim of the measurement is to draw comparisons (between e.g. different countries or markets), and even maybe to make some benchmarking, it is rarely possible to derive from a comparison that a policy could be transposed from one case to another. This is notably the case because underlying causes may be harder to compare. Finally, as for every case a statistic is created, there is the risk of seeing the so-called Goodhardt's law applying. This law states that once a statistic is created to address one problem, we tend to address the statistic in the simplest way, which does not necessarily solve the problem.

2. The Stirling definition of diversity as a mix of variety, balance and disparity

The section describes Stirling's (2007) definition of diversity as a mixture of *variety*, *balance*[1] and *disparity*: all other things being equal, the greater the variety/balance/disparity, the greater the diversity. To assess the diversity of any system (e.g. music production), this system must first be divided into different types or categories (e.g. titles, geographical origins, etc.) (see Figure 1).

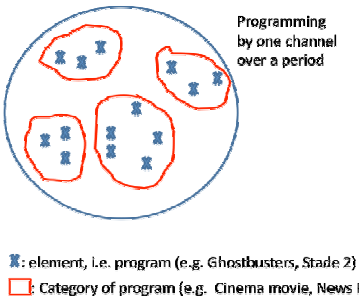


Figure 1: Representation of a system and the categorization of elements

[1] The term 'balance' is used here to convey the idea of the even spread of a product or form of expression. As the phrase 'even spread' is somewhat clumsy, however, the word 'balance' is used instead.

Variety corresponds to the number of different types (see Figure 2).

In terms of Variety B is more diverse than A

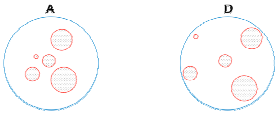
Figure 2: Illustration of variety

Balance represents the way every type is represented (see Figure 3). It can be measured by the proportion for every type (e.g. the number of goods for every type that is produced or sold as compared to the total number of goods available).

In terms of Balance C is more diverse than A

Figure 3: Illustration of balance

Disparity is the dissimilarity between existing types, for example between the farthest two types or for every pair (see Figure 4).



In terms of Disparity D is more diverse than A

Figure 4: Illustration of disparity

To make this definition clear, let us consider the evolution of music diversity on a French radio station. This station initially broadcasts around 100 different French pop songs. Five of these songs are played every hour while the others are broadcast far less frequently. Considering our first dimension, to increase diversity, we can increase either variety or balance or disparity. To increase variety, we can, for example, increase the number of different songs broadcast, from 100 to 150. To increase balance, we can reduce the number of broadcasts of the most broadcast songs and increase the broadcasts of the others. To increase disparity, we can choose to replace some of the French pop songs by songs of other styles, which were previously not broadcast, for example Brazilian Bossa Nova or Pakistani Qawwali songs.

Every component of diversity appears to evolve independently from the other components. However, this is only true to a certain extent. They are, in fact, inextricably linked through the notion of diversity. In our example, if variety is increased, it will probably have an impact on balance since to broadcast more songs implies that, on average, each song will be broadcast less frequently. Furthermore, if you have only one Bossa Nova song broadcast only once a week, it is not the same as if there were many songs in this style, which were played more often. More generally speaking, any categorization, i.e. any division of a system into categories, requires assumptions to be made about disparity even if these assumptions can be implicit.

This definition of diversity does not apply only for Cultural Diversity. Actually, it was first formulated by Stirling (1998) and applied notably on the diversity of energy

portfolios. Part or all of the components have also appeared in works on diversity of production (Hotelling, 1929; Lancaster, 1979), finance (Markowitz, 1952), psychology (Junge, 1994) and communication theory (Shannon, 1948). Biodiversity may be the notion derived from diversity that has been the most studied (Ranaivoson, 2007).

When applied to the analysis of cultural sectors, this definition of diversity needs to be enriched to take into account the need to distinguish between, on the one hand, supplied and consumed diversity and, on the other hand, diversity of products, of producers and of the audience (Ranaivoson, 2007).

3. An overview of previous uses of the Stirling definition: from variety to a complete approach

Most research, particularly less recent and theoretical texts, has relied on one component of the Stirling definition. Despite previous research combining the three components of this dimension, only recently have authors been able to combine all three effectively thanks to access to better data and a more solid theoretical background. Most theoretical approaches have considered only one: variety (Steiner, 1952; Spence and Owen, 1977; Baker, 1991; Gabszewicz et al., 2001; Allain and Waelbroeck, 2006). Among empirical models, some are focused on either variety (Rothenbuhler and Dimmick, 1982), balance (Levin, 1971; Hellman and Soramäki, 1985; Alexander, 1996; Van der Wurff, 2005) or disparity (Blank, 1966; Dowd, 2001).

Other articles have used two components, such as variety and balance (Levin, 1971; Chung and Cox, 1994; McDonald and Lin, 2004) or variety and disparity (Peterson and Berger, 1975; van Kranenbourg et al., 2004). There has been some research on diversity in cultural activities that have succeeded in considering the three components (Greenberg and Barnett, 1971; Lopes, 1992).

Only recently have papers applied the Stirling definition to cultural industries and thus taken the three components into account: film (Moreau and Peltier, 2004; Fialho de Araùjo, 2007; De Vinck, 2011; Lévy-Hartmann, 2011), publishing (Benhamou and Peltier, 2007), recording (Ranaivoson, 2010a), broadcasting (Farchy and Ranaivoson, 2011), heritage (Santagata and Saccone, 2011). A hurdle consists in measuring disparity and applying the Stirling index to measure variety, balance and disparity, which has been done by Benhamou and Peltier (2007) and Farchy and Ranaivoson (2011) but always at the expense of huge assumptions.

4. Measuring Diversity: the Stirling Index

The Stirling definition serves as the basis for the construction of the Stirling Index. Its use is exemplified in the research done by Farchy and Ranaivoson (2011), which compares the diversity of TV programs in three European countries (France, Turkey and UK), focusing on the main private and the main public channels for every country.

The three components of diversity are assessed through the use of the Stirling Index (Stirling, 2007): $\sum_{j,k\in[1,n]^2, j\neq k} \left(d_{jk}\right)^{\alpha}\left(p_j p_k\right)^{\beta}$. The index allows to address diversity in the most comprehensive way possible by considering variety, balance and disparity at the same time. While the Stirling definition has now gained recognition relative to the analysis of cultural diversity, the index has only recently been used in research on media and cultural industries (*e.g.* Benhamou and Peltier, 2011). The introduction of α allows us to play with the weight of disparity relative to variety and balance.[2] Likewise, the introduction of β allows us to play with the weight of balance relative to variety and disparity.[3] The aforementioned studies only consider when α = β = 1 (*e.g.* Benhamou and Peltier, 2011). However there is no reason to give preference to such values over others in the 0 to 1 interval.

In other words, this is the first time one index has been used to assess diversity, offered a complete approach for measuring and allowed for playing with the three components' different weights.

5. Properties of a set of indexes of diversity

The section discusses desirable properties for an index of diversity or a set of indexes of diversity. It expands on previous work on suitable properties of indexes of cultural diversity (Ranaivoson, 2007).

The first issue deals with the number of indexes to be used when measuring diversity. It depends notably on the issues analyzed in terms of diversity. Actually diversity may have different meanings according to the categorization used, which itself depends on the problem analyzed. For example, if the issue is of quotas of national (or European) content, as exists for songs in French in France, Canada or Belgium (Ranaivoson, 2010b), then the categorization should refer (but not necessarily restrict) to language or origin whereas the analysis of diversity of TV programs described before focuses on the diversity of genres.

The number and the type of indexes to be used depend also on the available data, in particular on their completeness. On one side a single index of diversity (e.g. the Stirling Index) is more easy to use (but not necessarily to build) and facilitates comparisons e.g. between countries or over time. However, such an index aggregates every piece of information, which is questionable when data based on different categorizations exist. Therefore there should be at least one index per type of categorization, e.g. one index for the diversity of origins, one index for the diversity of genres, etc. More generally a set of indexes facilitates the use of incomplete data and allows to keep more information.

[2] The lower α (with $0 < \alpha \leq 1$) is, the higher the emphasis on disparity (Farchy and Ranaivoson, 2011).
[3] The lower β (with $0 < \beta \leq 1$) is, the higher the emphasis on balance (Farchy and Ranaivoson, 2011).

There are two kinds of properties. The first is rather general and could apply to indexes on almost any topic while the second is more directly linked to the issue of diversity and also easier to apply mathematically.

First, a suitable set of indexes should strive towards *completeness* (Stirling, 2007) in the sense that every dimension should be represented and as far as possible every component of all three dimensions + consistency. This leaves relatively open the way in which different dimensions should be combined or different components compared. A suitable set of indexes should also be *parsimonious* (Stirling, 2007) by relying on simple indexes (rather simplicity of use). Similarly, it should be *transparent* (Stirling, 2007) insofar as the assumptions needed to build the indexes should be explicit. However, the values or classifications given by the set of indexes should not be too sensitive to a modification of parameters: it must be *robust* (Stirling, 2007). Given the available data, a suitable set of indexes should *not be too demanding* in terms of data necessary to build them (Ranaivoson, 2007). It should be noted that, to a certain extent, these properties can be contradictory, for example it is not that easy to obtain a set of indexes that are both comprehensive and not too demanding. Building any set of indexes will rely on a trade-off between these properties.

The second kind of property directly links to the definition of diversity. These properties may apply to the entire set of indexes or to a subset. First of all, if according to one variable all elements belong to the same type (i.e. variety equals one or there is no disparity or this is the most unevenly spread), every index linked to this variable should have a value equal to zero (Patil and Taillie, 1982; Stirling, 1998; McDonald and Lin, 2004; Stirling, 2007), and zero is the minimal value for any of these indexes. Thus if one studies diversity of consumed movies in a country and all these movies are nationally produced then all indexes linked to origin are equal to zero. Of course, other indexes linked to other variables may have a value different from zero for example those simply linked to the number of cinema ticket sales.

Indexes can also be monotonic functions of variety (Patil and Taillie, 1982; Pielou, 1975; Stirling, 1998; 2007), balance (Patil and Taillie, 1982; Stirling, 1998; 2007) or disparity (Weitzman, 1992; Solow et al., 1993; Stirling, 1998; Stirling, 2007). For example, if more discs are sold, meaning an increase in consumed products, this should increase diversity. However, it should be noted that this is only a *ceteris paribus* result since this increase in sales might affect diversity for other variables (e.g. in terms of origin) or for other dimensions of diversity.

There are other properties that seem less crucial. Some authors want any diversity index to be equal to one at its maximum (McDonald and Lin, 2004, p.106). Other suggest that the indexes should be easily combinable with other relevant properties of the system (Stirling, 2007) in order to facilitate trade-offs with other properties such as efficiency.

6. Concluding remarks

The paper has presented and discussed the Stirling Model of Cultural Diversity, i.e. the Stirling definition (diversity as a mix of variety, balance and disparity) the Stirling Index. The Stirling Model provides a clearer understanding of not only this complex notion but also how it is to be assessed through numerous cultural activities. It might be interesting to consider other dimensions of cultural diversity, such as, on the one hand, supplied and consumed diversity and, on the other hand, the relations between product, producer and consumer diversity. To substantiate the validity of the Stirling Model, the paper has provided an overview of existing literature and shown how it builds on existing research on Cultural Diversity.

Defining and measuring are useful notably for policy purposes. The paper has however also provided a list of the main pitfalls threatening any assessment of Cultural Diversity, which the Stirling Model should aim at avoiding. The first one consisted in objectivizing categories. In fact the aim of the methodology is to make explicit the subjectivity behind the building of categories. People applying it should not try to find objective features rather a way to express the subjective features everybody has, and the most consensual one. Another risk identified was getting a purely mechanistic view of diversity. The response here consists in not forgetting that any attempt at measurement always implies losing some information, as reminded in the discussion of the properties of a good set of indexes. Another consequence is that successful policies in favour of diversity cannot only be transposed from one country (or sector) to another but need to be adapted to the context. Finally, the reflection prior to the building of indexes should prevent the Goodhardt's law to take place. Any measurement of diversity is limited and should therefore be questioned and this questioning should be made easier by the explicitation of the categorization used to build the indexes of Cultural Diversity. In addition the methodological framework proposed by the paper is flexible enough to allow the inclusion, or the dropping, of indexes while restrictive enough so that not anything can be said to allow an increasing of diversity.

Needless to say, many questions are yet to be explored, which notably deal with the dynamics of Cultural Diversity and the roles of innovation and preservation in this dynamics. Most importantly at this stage: how could policies take into account the Stirling model? Two observations may be made here. Firstly, since the notion of cultural diversity covers many dimensions, there can be no single policy in favour of cultural diversity; instead, there will be policies that foster certain aspects of it, while sometimes harming others. Policies should then be carefully designed. Secondly, to measure the impact of policies it is necessary to evaluate them once they have been implemented; such assessment would also make it possible to improve or terminate them.

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